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Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street SW
Washington DC 20554

Re: ET Docket No. 18-295, *Unlicensed Use of the 6 GHz Band*
GN Docket No. 17-183, *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*
***Ex Parte* Communication**

Dear Ms. Dortch:

The Fixed Wireless Communications Coalition (FWCC) responds to *ex parte* filings from RLAN proponents dated August 22, 2019 (August 22 filing)[1] and August 23, 2019 (August 23 filing).[2]

These submissions are part of the proponents' ongoing, as yet unsuccessful, effort to establish that certain 6 GHz unlicensed RLANs can operate free of automatic frequency control, without causing harmful interference to Fixed Service (FS) receivers. Our analyses have shown the opposite: that uncontrolled RLANs at any useful power are statistically certain to cause harmful interference to the FS. For that reason, they cannot lawfully be authorized.

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1 Letter from Paul Margie, Counsel to Hewlett Packard Enterprise and Broadcom Inc., to Marlene H. Dortch, Secretary, FCC (Aug. 22, 2019), and two attachments.

2 Letter from Paul Margie, Counsel to Apple Inc. *et al*., to Marlene H. Dortch, Secretary, FCC (Aug. 23. 2019), and two attachments.

Response to August 22 Filing

The first attachment to the August 22 filing, titled "Packet Captures of Video Buffering over Wi-Fi on Common Cloud Services," attempts to justify using a low RLAN duty cycle in estimating the effects of interference.

The RLAN duty cycle is largely irrelevant to FS interference.

Duty cycle calculations are useful for estimating ***average*** levels of RLAN signal over time. But average levels do not cause interference. We have emphasized throughout that FS interference most often results from a single source atypically located in or near the receiver main beam, with little or no intervening attenuation. When these conditions coincide with a fade—inevitable, given 958,062,017 projected RLANs[3] among 97,000 FS receive links—the RLAN transmission cripples the FS link. The only effect of a low duty cycle is to add a few seconds' possible delay before the RLAN transmits (and the link fails).

The second attachment, "Demonstration of Low Power Indoor RLAN I/N from High-Rise Buildings in New York City & Washington DC," excerpts an earlier RLAN filing and adds one case. We have pointed out the defects in that earlier filing.[4] Although information on the additional case is incomplete, it appears to be subject to the same defects.

Response to August 23 Filing

The first attachment to the August 23 filing, titled, "6GHz FS/WiFi coexistence testing," uses a benchtop simulation to argue that that even relatively strong RLAN interfering signals will not affect the operation of an FS link.

The filing is incorrect in asserting that that FS automatic transmit power control (ATPC) and adaptive coding and modulation (ACM) will protect links against RLAN interference.

ATPC compensates for a deep fade by raising the transmit power. Its responds to a drop in power level at the receiver. But ATPC is useless against RLAN interference. ATPC does not increase the fade margin: an FS transmitter is licensed at the ATPC maximum transmit power, so a fade margin calculated from ULS data already includes the ATPC benefit. Worse: because ATPC is triggered by a low received signal level, in the absence of fading it does not react at all to the

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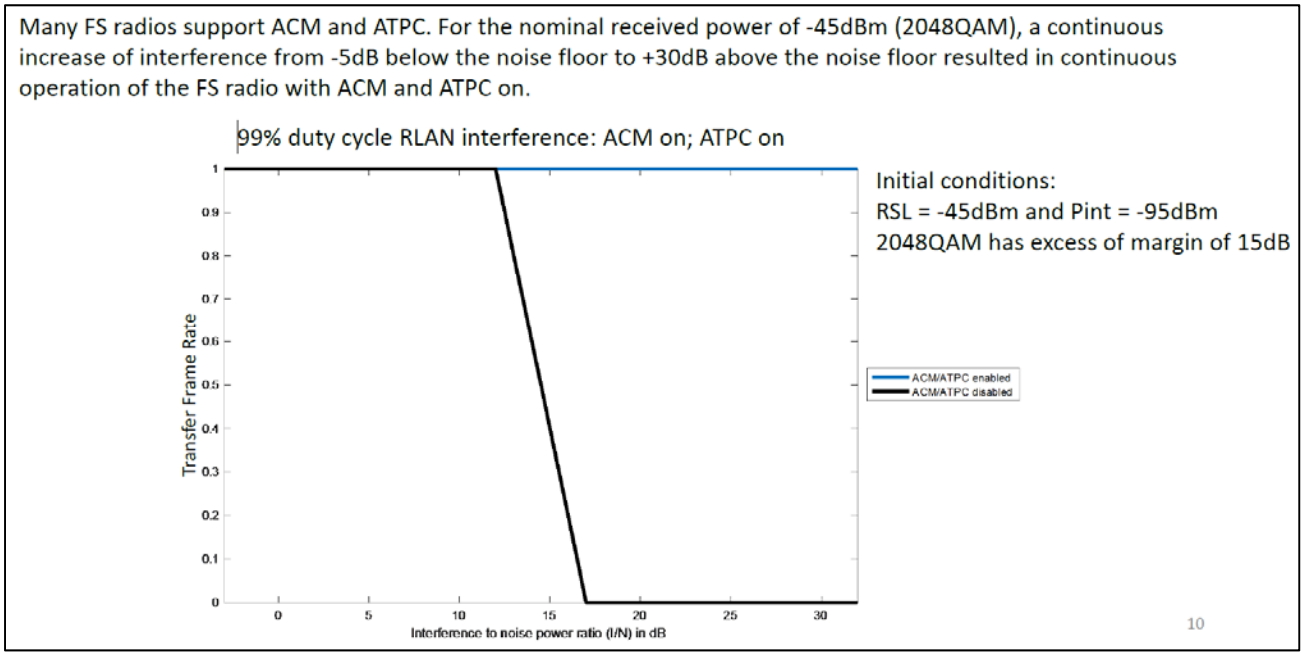
3 *Frequency Sharing for Radio Local Area Networks in the 6 GHz Band January 2018*, attached to Letter from Paul Margie, Counsel to Apple Inc., *et al.*, to Marlene Dortch, Secretary, FCC, in GN Docket No. 17-183 at 12, Table 3-1 (filed Jan. 26, 2018).

4 Letter from Donald J. Evans, Mitchell Lazarus, and Seth L. Williams, Counsel for the Fixed Wireless Communications Coalition, to Marlene Dortch, Secretary, FCC (Aug. 22, 2019).

degradation in signal quality caused by RLAN interference.[5] Statements that ATPC makes a link more robust against RLAN interference are simply wrong.

ACM downshifts the transmitter to a slower, more robust modulation in response to degraded signal quality, as from fading, interference, or some combination of the two.

The figure below is reproduced without change from the RLAN proponents' August 23 filing:[6]



Without ACM (or ATPC), the black line shows the link failing for I/N greater than +12 dB. But ACM must react at a lower I/N to protect the receiver. In practice, as I/N increases from about +10 dB, ACM cycles the link down through multiple modulation profiles, reducing the link capacity at each change. Although the figure reproduced above shows the link rate (Y axis) on a continuous scale from 0 to 1, in fact the pipe becomes smaller in steps with each downshift in modulation.

For an RLAN to cause these downshifts would be unlawful. An unlicensed device may not cause harmful interference to a licensed service.[7] The Commission's definition of "harmful

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5 The applicable standard states: "ATPC-equipped transmitters must base transmit power increases on path fading. Interference or error correcting information alone must not be used for increasing transmit power …." *Interference Criteria for Microwave Systems* ANSI/TIA Standard 10 at 164 (June 2019).

6 August 23 filing, first attachment at 10.

7 47 C.F.R. § 15.5(b).

interference" includes "[i]nterference which … ***seriously degrades***" a licensed service.[8] RLAN interference that triggers ACM and thereby degrades FS throughput is harmful interference by definition. Proponents' argument that ACM will keep an FS link in operation is a concession that RLANs will cause harmful interference. For the Commission to authorize unlicensed RLANs having a significant potential to case harmful interference to FS receivers would violate the Communications Act.[9]

The second attachment to the August 23 filing, "FS outdoor testing in progress," briefly describes a 6 GHz FS link to be used for interference testing. It does not describe the test conditions. We trust those will include the statistically inevitable cases of RLANs in all plausible geometric relationships with FS receivers. These include RLANs in the FS main beam with little or no attenuation, as will occur with the RLAN either outdoors or in an older building of traditional construction.[10] The test conditions should also include RLANs in the FS main beam within single-digit kilometers of the tower, where RLAN operation even in a modern, energy-efficient, high-attenuation building during deep fades will cause FS signal degradation.[11]

CONCLUSION

Our analyses have shown that RLANs without AFC control will cause harmful interference to FS links. The RLAN proponents have failed to show otherwise.

Respectfully submitted,

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Seth L. Williams
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Communications Coalition

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8 47 C.F.R. § 2.1 (emphasis added).

9 *American Radio Relay League, Inc. v. FCC*, 524 F.3d 227, 234-35 (D.C. Cir. 2008). For a discussion of the legal issues, *see* Reply Comments of the Fixed Wireless Communications Coalition at 7-8 (filed March 18, 2019).

10 We have shown that an FS receiver's main beam can easily contain non-high-rise buildings of traditional construction having zero-attenuation windows. Letter from Donald J. Evans, Mitchell Lazarus, and Seth L. Williams, Counsel for the Fixed Wireless Communications Coalition, Marlene Dortch, Secretary, FCC at 4-5 (Aug. 22, 2019).

11 *Id*. at 11.